From IR to X-rays: approaches to go through the coating system of historical bowed string musical instruments

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Some historical bowed string musical instruments produced in Italy from the 16th to 18th centuries are considered until now peak-quality masterpieces of the violin-making art. Technical skills were mostly lost after the disappearance of the prominent workshops, and nowadays ancient methods and materials are charming secrets to be revealed by scientific techniques.

This work discusses the results obtained by investigating the complex coating systems on bowed string instruments produced by four violin-makers, namely: Jacobus Stainer, Gasparo da Salò, Giovanni Paolo Maggini, and Lorenzo Guadagnini. They were selected in order to represent convincingly – albeit not exhaustively – the variety of situations that can be encountered when multi-layered coatings on historical bowed string instruments are considered.

The coating systems have been investigated though micro-invasive and non-invasive procedures [1], employing UV-imaging, portable X-ray fluorescence, optical microscopy, scanning electron microscopy coupled with energy-dispersive X-ray spectrometry, and Fourier-transform infrared microscopy. In addition, two tomographic techniques (synchrotron radiation micro-computed tomography and optical coherence tomography) have been used to image the finishing layers spread on the wood substrate [2, 3].

Chemical investigations and images on cross-sections have been compared with the morphological view obtained by tomography, with particular attention to the ability of the tomographic insight to distinguish and measure the various overlying layers, and to highlight the presence of dispersed particles.

References

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